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A MULTIVARIATE ANALYSIS OF REENLISTMENT INTENTIONS OF NAVAL RESERVISTS

by

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September 1989

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# A Multivariate Analysis of Reenlistment Intentions of Naval Reservists

by

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Submitted in partial fulfillment of the requirements for the degree of

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ABSTRACT

The purpose of this thesis is to identify factors that influence a selected naval reservist's intention to reenlist in the reserves. The sample consists of 4060 naval reserve male enlisted members drawn from the 1986 Reserve Components Survey. The thesis constructs a multivariate reenlistment model consisting of traditional predictor variables. Additional predictor variables were then added to determine if an improved model could be developed. Bonus payments, unit morale, acquaintances and friendships, mobilization income, and opportunity to serve one's country were the non-traditional variables found to positively influence an individual's decision to remain in the reserves. These variables added significantly to the predictive accuracy of the reenlistment model and should aid Navy managers in developing incentives for increasing retention.

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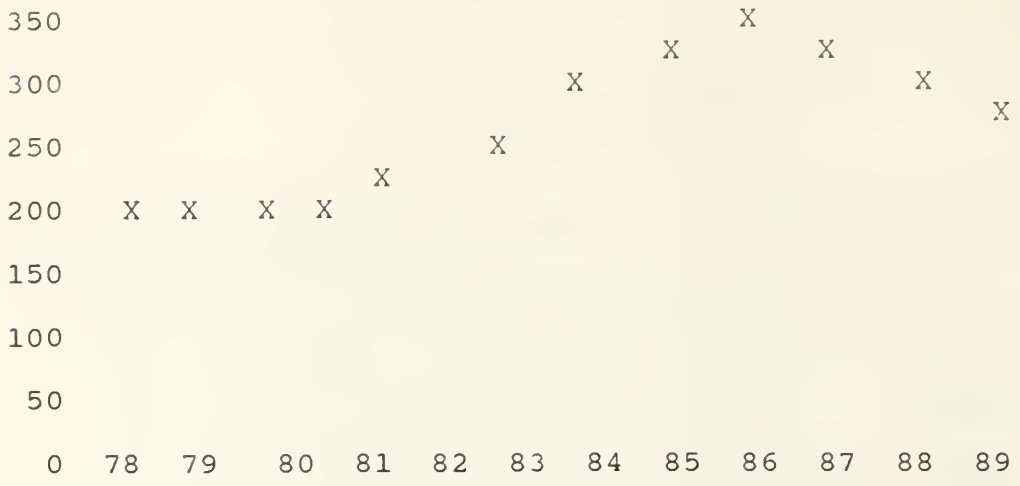
# I. INTRODUCTION

The defense budget, as stated in President Reagan's proposed fiscal year 1989 government budget, will increase by about one percent annually through 1993. Assuming that the economy performs as predicted, this actually results in reduced (real) budgets through 1993. Additionally, the Gramm-Rudman-Hollings Act has provisions requiring government to balance the budget. The bill requires that any spending reductions needed to balance the budget must come from discretionary areas of the budget and not from entitlements. The bill requires that 50 percent of the reductions come from Defense and the remaining 50 percent from other areas of discretionary spending. Due to the size of the Defense budget in relation to other areas of discretionary spending it would carry a larger burden of the necessary reductions. The spending reductions will be immediate and irreversible. This is not a new phenomenon, the real defense budget authority has been steadily declining since 1985. Figure 1 shows the decline that started in 1985 and is predicted to continue. [Ref. 1]

Facing declining budgets the Department of Defense must look within to improve efficiency and save money in all possible areas. An increase in military retention is one method to achieve savings of manpower dollars. Although




NOTE: For 1980-1985, the figures are yearly averaged attained strengths; for 1986-1991, the figures are from the 1987 Presidential budget request. All figures include all training categories and both officers and enlisted personnel.

Figure 1. Real Defense Budget Authority in Billions of Constant Fiscal 1989 Dollars

military service retention has had considerable attention, there has been little research on Naval Reserve retention. An increase in reserve retention would also lead to Department of Defense savings.

Since 1973 the services have integrated the Active and Reserve components into a total force. The Department of Defense now bases its national security plans on the Total Force concept. Several researchers have shown that when certain missions are transferred to the Naval Reserves there can be substantial manpower cost savings [Refs. 2,3]. Thus the Navy, which has lagged behind the other services in the ratio of Reserve forces to Active forces, is programmed to

increase the relative size of the Naval Reserve throughout the early 1990's. An increase in reserve retention would mean a lower number of affiliations during the expansion. The lower the number of affiliations, the lower the recruiting, training and manpower costs.

There is also the shrinking manpower supply of 18 to 24 year olds to consider. [Refs. 4,5]

> The population 18 to 24 years peaked in 1981 at 30.5 million--a total that may not be surpassed for at least the next 100 years. This military age group will decline by around 7 million through 1996 and then gradually increase again to peak at around 27.7 million in 2010.

The Naval Reserves now recruit from the 18 to 24 year old non-prior service population in order to man the Surface Air Mariner (SAM) program.

Finally, there is the AIDS epidemic which may reduce the current force and the population from which the Naval Reserves recruit. [Ref. 6]

> Based on current levels of HIV infections (estimated at 1.5 million persons nationwide), the U.S. Center for disease control expects 324,000 diagnosed cases of Aids by the end of 1991. By 1991, the disease is expected to rank behind accidents as the second highest cause of "premature death" among men.

If the supply of manpower is decreasing then the need to retain current members increases (assuming a constant end-strength), not only because there is a smaller population from which to recruit but also because the active Navy will undoubtedly initiate programs to increase active duty retention. This will in

turn reduce the number of Navy veterans who are available to join the Naval Reserves.

Through analysis of the data in the 1986 Reserve Components Survey and Defense Manpower Data Center's (DMDC) Reserve Component Common Personnel Data System (RCCPDS) a model predicting Naval Reserve enlisted retention will be developed in this thesis. The major factors that influence a person's stated intention to reenlist will be identified. Other questions that will be explored are:

1. Do medical, retirement, commissary and exchange privileges contribute to a reservist's retention intention?
2. Can factors be determined that quantify a Reservist's feelings of patriotism, service to country, camaraderie, training and other aspects?
3. Do local economic conditions influence retention intent?
4. Do retention intentions between non-prior and prior service reservists different?

Chapter II presents a literature review and brief description of the research methods used. The literature covers retention, attrition and reenlistment in the military services including both active duty and selected reserves. Chapter III describes the sources of data and the sample sizes, the estimation techniques, and specifies the model. Chapter IV presents the results of estimating the retention model and discusses the "goodness-of-fit" and other statistics. Chapter V presents the conclusions and recommendations derived from the research.

## II. LITERATURE REVIEW

This review concentrates on recent research on enlisted retention, attrition and reenlistment. It is important to look at all three areas in an effort to develop a model that includes variables which influence an individual's decision to reenlist.

### A. STUDIES OF AFFILIATION BEHAVIOR

The studies involving affiliation look at the factors that affect an individual's decision to join the Naval Reserve. Although this differs from an individual's decision to remain in the service (retention), the variables identified in affiliation models may yield insight into the retention decision.

A study by Shiells [Ref. 7] examined affiliation of Navy veterans with the Selected Reserve. The variables identified were those that influence a Naval veteran's decision to affiliate with the Selected Reserves. The explanatory variables used are real reserve wages, local unemployment rate, paygrade, education and ability, personal characteristics (sex, race, marital status and age), census region and ratings. The equations were estimated by logit model and took the following form:

$$\ln (P_A/1-P_A) = B_0 + B_1WRES + B_2URATE + B_3PG + B_4EDUC + B_5MG + B_6SEX + B_7RACE + B_8AGE + B_9MARRIED + B_{10}REGIONS + B_{11}RATINGS + u$$

where:

| | | |
|---|---|---|
| $P_A$ | = | probability of affiliation |
| WRES | = | wages from Reserve employment |
| URATE | = | unemployment rate |
| PG | = | paygrade |
| EDUC | = | education |
| MG | = | mental group |
| SEX | = | gender |
| RACE | = | race |
| AGE | = | age |
| REGION | = | matrices of regional dummy variables |
| RATINGS | = | matrices of regional rating variables. |

The results of this study indicate that pay has a significant and positive influence on affiliation rates in six out of 11 rating groups. Higher unemployment rates result in increased affiliation rates in ten out of 11 rating groups. The result for geographic affiliation rates show moderate support for higher rates in the Middle Atlantic region, and strong support for higher rates in New England, South Atlantic, West North Central, West South Central and Mountain. Shiells concluded that "affiliation rates differ between

regions because of unobserved variations in tastes and opportunities, not because of regional variations in sensitivity to pay." [Ref. 7:p. 34]

The parameter estimates for personal characteristics suggest that race and gender had the strongest influence and that both were significant at the 99 percent level. Non-whites and female Navy veterans have significantly higher estimated affiliation probabilities. The study also showed that age and marital status are rarely significant, that high school graduates were significantly less likely to join the reserves, and that lower mental groups were more likely to affiliate.

According to a study by Quester [Ref. 8] selected reserve affiliation is positively influenced by real reserve pay and civilian unemployment. Also, she found that older Naval veterans (age 24 and 25) are more likely to enlist, and that lengthening the Universal Military Training obligation from six to eight years would increase the affiliation rate.

B. STUDIES ON MOONLIGHTING

An individual serving in the Naval Reserve attends drills once a month, usually on weekends, and serves on Active Duty for training (ACDUTRA) for two weeks out of the year. This could be considered a part-time or secondary job. Therefore, research on secondary jobs should be useful for identifying independent variables helpful in predicting reserve retention.

Perlman [Ref. 9] developed the moonlighting model to analyze the motivations of individuals holding secondary part-time jobs. The model is based on the concept that the amount of time a person spends working on a part-time job "moonlighting" is directly proportional to the amount of "underemployment," which is the difference between the actual and desired number of hours of work on the primary job.

An empirical analysis by Shisko and Rostker examined the determinants of second job hours and participation. [Ref. 10] They showed that an increase in non-labor income would decrease the amount of time and probability of holding a secondary job (moonlighting). They also showed that moonlighting is positively related to the secondary job wage rate and negatively related to the pay and number of hours worked on the part-time job.

Mehay [Ref. 11] recently studied whether moonlighting and reserve participation were the same labor force phenomena, concentrating on affiliations with the Army Reserve. He used data from the Current Population Survey (CPS) and merged it with the 1979 Reserve Force Studies Survey, thus providing a choice-based sample of civilian secondary job holders and reservists. The occupational choice equations were estimated by the multinomial logit model and had the following general forms:

$$\ln (P_r/P_f) = g(\underset{\text{factors}}{\text{economic}}, \underset{\text{factors}}{\text{personal}}, \underset{\text{factors}}{\text{labor market}})$$

$$\ln (P_m/P_f) = h(\underset{\text{factors}}{\text{economic}}, \underset{\text{factors}}{\text{personal}}, \underset{\text{factors}}{\text{labor market}})$$

where $P_r$, $P_m$, and $P_f$ refer, respectively, to the probability of participating in the Reserves (r), of moonlighting (m), or of holding one primary civilian job only (f); E represents a vector of economic factors drawn from the moonlighting model, D represents a vector of personal characteristics, and G represents a vector of labor market characteristics describing the SMSA in which the individual resides.

Mehay concludes that "The effects of the basic variables from the moonlighting labor supply model differ significantly for Reservists and moonlighters." [Ref. 11:p. 5] However, family income levels were negatively associated with reserve participation while family size had a positive effect on reserve participation. The results from the model indicate that motivations for joining the reserves were the same for both prior and non-prior service people. High-growth metropolitan areas appeared to weaken interest in the Reserves, whereas higher unemployment areas increased Reserve participation. The overall conclusion was that the decision to participate in the Reserves is not equivalent to the decision to hold a secondary civilian job. Nonetheless, local economic conditions was a significant influence on reserve affiliation.

## C. STUDIES ON ATTRITION

The studies that deal with attrition from military service look at factors which affect an individual's decision to leave the service before completion of his term of enlistment. This is different from retention, which refers to reenlisting once one's current term of service is completed. However, looking at factors that contribute to leaving the service before completing one's enlisted active obligated service may also give insight into why a person would remain to finish it.

May [Ref. 12] developed a model of attrition which allows for the simultaneous impact of personal characteristics on Selected Marine Corps Reserve attrition. The personal characteristics explored included race, age, marital status, service history, sex and education. The statistical tests revealed that personal characteristics have a greater influence during the first three years of service. Among prior-service personnel, older people and high school graduates have a higher survival rate in the short run than their counterparts. In the non-prior-service category, single people, high school graduates, whites and males have a higher probability of survival in the short run than their counterparts. In the long run, in the prior-service category, older, married people and women are most likely to survive; in the non-prior-service category, older, single people, high school graduates and women survive better than others.

Thomas, Albiso, Buscher and Kocher [Ref. 13] looked at personal and occupational factors that affect early attrition in the United States Army Reserve (USAR). They studied prior and non-prior service population characteristics, what people did after leaving and the timing of the losses. The specific personal and occupational factors used in the models were gender, race, marital status, number of dependents, age at entry, education, AFQT, cohort year, term of enlistment, paygrade at entry and mental category. The factors, and their effect on USAR attrition, are summarized in Table 1.

TABLE 1

PERSONAL AND OCCUPATIONAL FACTORS
AND HOW THEY AFFECT USAR ATTRITION

| Raise Attrition | | Lower Attrition | |
|---|---|---|---|
| Prior Service | Non-prior Service | Prior Service | Non-prior Service |
| NHSG | 20-24 yrs | 25 & up | 17 |
| | 25 & up | Mental I-IIIA | Mental I-IIIA |
| | NHSG | E5 & up | E2 & up |
| | GED | 1-5 yr term | 3 yr term |

The regression results showed that being married or having dependents were not significant at the five percent level, and that the effect of race was inconclusive.

Clay-Mendez and Gregory [Ref. 14] researched the survival patterns of active mariner and ready mariner recruits. The active and ready mariner programs were established to provide the Selected Naval Reserve with lower paygrade, non-prior

service personnel (i.e., cheap labor). It was important to determine the survival patterns of these individuals because the extensive training required by non-prior service people raises accession costs and recently the Naval Reserve has substantially increased the number of non-prior service accessions. The study outlined cohort attrition rates by the following categories; A-school active mariners, Non-A-School active mariners, ready mariners, and time-in-service. It also calculated the average training costs per individual by the above categories. This study did not consider personal characteristics. Clay-Mendez and Gregory concluded that "Ultimately, the cost effectiveness of accession programs for low paygrade personnel depends on the Navy's ability to retain individuals in the Selected Reserves." [Ref. 14:p. 11]

## D. STUDIES ON RETENTION AND REENLISTMENT

A Naval Postgraduate School master's thesis by Donald Fithian [Ref. 15] analyzed the retention of first-term enlisted personnel in the Army Reserve and National Guard. Using factor analysis, this study investigated the importance of quality of life, pecuniary benefits, unit personnel, unit resources, unit weapons, education/training, and promotional opportunities available, on a person's decision to remain in the Army Reserves and National Guard. These factors were then added to the traditional model and a logit regression was run. The variables that had a positive influence on the probability

of reserve retention were marital status, race and ethnic group, quality of life, education/training, and promotional opportunities.

Hand, Griffeth, and Mobley [Ref. 16] researched active duty reenlistment behavior and concluded that training opportunities, travel opportunities, advancement opportunities, pay, benefits and job security all had a positive affect on a members decision to reenlist. The factors that had an influence on members that chose to leave were long work hours, separation from family members and poor leadership.

Thomas and Davis [Ref. 17] analyzed prior-service first-term Army Reserve males using the 1985 Department of Defense Survey of Officer and Enlisted Personnel and the 1986 Reserve Components Survey. They found that race, age, marital status, number of dependents, the parents' level of education, and the parents' income were significant positive factors concerning a member's reenlistment decision.

# III. METHOD OF ANALYSIS

## A. DATA SETS USED

### 1. 1986 Reserve Components Survey

The data used in this thesis are taken from the 1986 Reserve Components Survey: Selected Reserve Officer and Enlisted Personnel [Ref. 18], conducted for the Office of the Assistant Secretary of Defense (Reserve Affairs) and the Office of the Assistant Secretary of Defense (Force Management and Personnel) by the Defense Manpower Data Center. The 1986 Reserve Components Survey polled a sample of Selected Reserve unit members and Individual Mobilization Augmentees (IMAs) or Selected Reservists who train with the active components. Individuals in the training pipeline were excluded from the survey. The final sample provided a 10 percent sample of most categories of individuals. It also contained a larger than ten percent sampling for women and officers. Data collection for the survey began in February 1986. The last questionnaires were received by the survey processing contractor in June 1986. The majority of the questionnaires were completed in March and April 1986. Details of the survey design are available in the User's Manual and Codebook for the 1986 Reserve Components Survey.

This thesis concentrates on Naval Reserve enlisted personnel, so the remainder of the data descriptions are

confined to these individuals. Table 2 provides the number of enlisted people in the Naval Reserve population, the number selected for the survey, the number eligible, the number responding, and the response rates.

TABLE 2

1986 RESERVE COMPONENTS SURVEY RESPONSE RATES
ENLISTED NAVAL RESERVISTS

| | |
|---|---|
| Total Enlisted Naval Reservists | 100,653 |
| Number Selected to Participate | 9,898 |
| Number Eligible | 8,132 |
| Number Responding | 4,893 |
| Unadjusted Response Rate | 49.4% |
| Adjusted Response Rate | 60.2% |

Source: 1986 Reserve Components Survey Users Manual and Codebook

The administrative procedures specified that only those who were unit members at the time of data collection were eligible. Thus, the calculation of the adjusted response rate was necessary to get a true picture of the eligible members who responded.

The adjusted response rate was calculated by comparing the sample selected as of 30 October 1985 with: (a) the survey control files which reflect information received from units as to whether the reservists selected were still unit members when data were collected, and (b) the 30 June 1985 Reserve Components Common Personnel Data System (RCCPDS) administrative files for units who did not provide this information. This comparison allowed for the identification of both those who do not appear on RCCPDS at all and those

who had made various transfers within the reserve components. [Ref. 18:pp. 2-14]

The adjusted response rate of enlisted Naval Reservists is 60.2 percent which is slightly lower than the overall response rate of 62 percent. However, it is higher than the enlisted combined reserve components response rate of 58.4 percent.

The survey questionnaire is 20 pages long containing 127 separate questions. The survey is available in two versions; a Statistical Analysis System (SAS) file and an Operating System (OS) file. The SAS file is used to analyze the data for this thesis. SAS Release 5.0 running on an IBM 3033 mainframe was used for all calculations.

2. Reserve Components Common Personnel Data System (RCCPDS)

The 1986 Reserve Components Survey did not include questions that would help identify geographic location of the member's unit or home. This information is necessary to try to assess the effects of local economic conditions on an enlisted member's behavior. Questions regarding the member's date of rank and years of service also were not included in the survey. This information is necessary to try to identify the program into which the member enlisted (e.g., ready mariner, surface air mariner, active mariner).

In an effort to get a clearer picture of what attributes affect a member's retention decision it was necessary to collect data on rank and years of service from the Defense Manpower Data Center (DMDC). DMDC merged the

requested information from the Reserve Components Common Personnel Data System with the 1986 Reserve Components survey and created an expanded Navy enlisted SAS file. The matching was accomplished by using individual social security numbers. During the creation of this new file it was necessary to delete 619 members from the data set due to missing information. This new file was used to estimate the behavioral models below.

3. Local Area Unemployment Statistics (LAUS)

To analyze the effects of local economic conditions, the member's home zip code (obtained from RCCPDS) was matched with the unemployment rate for that county. This information came from a Bureau of Labor Statistics file called Local Area Unemployment Statistics for States and Local Areas (LAUS). The unemployment statistics were for the month of December 1985. The December 1985 county unemployment rates were chosen because they were those closest to February and March 1986 when the survey was filled out and because they were readily available.

4. Sample Characteristics

The final sample size for Naval Reserve enlisted personnel was 4060, after deleting 214 observations due to missing zip codes and questions that were not answered or data that was found to be "bad" (assigned the values of -1 and -2). Table 3 lists various descriptive statistics for the sample. As shown in Table 3, the majority of those surveyed had prior

TABLE 3

DESCRIPTIVE STATISTICS

| Paygrade | Non-Prior Service | Prior Service |
|---|---|---|
| E1-E3 | 402 | 172 |
| E4 | 161 | 496 |
| E5 | 188 | 1005 |
| E6 | 103 | 972 |
| E7-E9 | 41 | 520 |
| Totals | 895 | 3155 |
| **Gender** | | |
| Male | | 88.0% |
| Female | | 12.0% |
| **Race** | | |
| Black | | 10.3% |
| Hispanic | | 6.2% |
| White | | 80.7% |
| Other | | 2.8% |
| **Education** | | |
| 12 grades or less/ no diploma | | .5% |
| HS certificate other than diploma | | 8.9% |
| HS diploma | | 35.4% |
| 1-2 years college | | 27.3% |
| 3-4 years college | | 16.7% |
| More than 4 years college | | 6.7% |
| **Marital Status** | | |
| Married first time | | 46.5% |
| Remarried | | 10.4% |
| Widowed | | .3% |
| Divorced | | 8.7% |
| Separated | | 1.2% |
| Single, never married | | 32.8% |

Source: Supplementary Tabulations from the 1986 Reserve Components Survey Volume 1

service. This is not cause for concern because, as noted earlier, the Naval Reserves are primarily made up of prior service personnel. This also accounts for the relatively

small numbers of people in the E-1 to E-3 categories. Generally, people in these paygrades would be in their first few years of service. Another interesting statistic is that 32.8 percent of enlisted personnel were single and never married. This is a large percentage compared with 21.6 percent for the population of the United States. While at first glance this seems to be rather a large proportion, it is not surprising considering the amount of time sailors spend at sea. The percentage of divorced service members is 8.7, while the percentage of divorced for the total population is 13.5. [Ref. 19] This could indicate that while members take longer to decide to marry they are more likely to remain married in comparison to the general population. The remainder of the descriptive statistics are as expected.

## B. LOGIT MODEL SPECIFICATION

The technique known as "multivariate regression analysis" is one of the most statistically well-developed methods of analyzing an individual's behavior. This approach specifies the models or relationships to be studied, collects the data needed to quantify the models and quantifies the models with estimates obtained from the data. The use of regression analysis to analyze the data allows a set of independent variables to predict the actions of a dependent variable. This procedure can test whether a significant quantitative relationship exists between the independent and dependent

variables. [Ref. 20:pp. 4-5] The logit probability model has two desirable features: (1) As $X_i$ increases, $P_i = E(Y = 1|X)$ increases but never steps outside the 0-1 interval, and (2) the relationship between $P_i$ and $X_i$ is nonlinear. [Ref. 21:pp. 480-482]

The logit model is based on the cumulative distribution function of a random variable. Therefore, one can easily use the CDF to model regressions where the dependent variable is dichotomous, taking 0-1 values. The dependent variable of interest is defined as an individual's intention to leave the service. The decision to leave the service is a dichotomous variable which assumes a value of zero if he intends to leave and a value of one if he intends to stay. This model relates the participation decision of the ith individual, Yi, to a vector of characteristics for that individual, Xi. The assumed relationship is:

$$P_i = E(Y=1|X_i) = \frac{1}{1 + e^{-(B_0+B_1X_{11} + \ldots + B_1X_{1k}}} \quad (1)$$

where e is the base of the natural logarithm. For ease of exposition, we write the above as

$$P_i = \frac{1}{1 + e^{-Z_i}} \quad (2)$$

where $Z_i = B_1 + B_2X_i \ldots B_kX_k$.

Equation (1) is known as the (cumulative) logistic distribution function. If $P_i$, the probability of remaining in the service, is as given in Equation (2), then, $(1 - P_i)$, the probability of not remaining in the service, is:

$$1 - P_i = \frac{1}{1 + e^{Z_i}} \tag{3}$$

Therefore, we can write

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \tag{4}$$

Now $P_i/(1-P_i)$ is simply the odds ratio in favor of remaining in the service--the ratio of the probability that a member will remain in the service to the probability that he will not remain in the service.

Taking the natural log of (4), we obtain

$$L_i = \ln(P_i/1 - P_i) = Z_i = B_o + B_1X_{11} + \ldots + B_kX_{1k} \tag{5}$$

where L is called the logit.

C. DEVELOPMENT OF THE MODEL

The first step in developing an improved model to predict reserve retention is to define a standard reference model. It

is then possible to incorporate additional variables into the standard model and compare the regression results of the standard model with those of the model that includes the newly defined variables. A literature review showed that certain variables were found in most naval reserve or military retention models. The variables identified were gender, marital status, age, education, race and number of dependents. The following section discusses the variable selection and description.

## D. VARIABLE SELECTION AND DESCRIPTION

### 1. The Dependent Variable

The survey asks the question "How likely are you to REENLIST OR EXTEND at the end of your current term of service? Assume that all special pays which you are currently receiving are still available." The choices available range from No Chance (0 in 10) to Certain (10 in 10). The frequencies for the question are shown in Table 4.

In order to use this variable in the multivariate logit regression the dependent variable must be assigned values of either zero or one. The responses 0 ("No Chance") through 4 ("Fair Possibility") will be assigned a value of 0 indicating the individual intends to leave. The responses 5 ("Fairly Good Possibility") through 10 ("Certain") will be assigned a value of 1 indicating the individual intends to reenlist. [Ref. 15]

TABLE 4

1986 RESERVE COMPONENT SURVEY, FREQUENCIES FOR NAVY ENLISTED RESPONSES TO THE QUESTION, "HOW LIKELY ARE YOU TO REENLIST OR EXTEND AT THE END OF YOUR CURRENT TERM OF SERVICE?"

| Response | | Frequency | Percent |
|---|---|---|---|
| (0 in 10) | No Chance | 307 | 7.65 |
| (1 in 10) | Very slight possibility | 192 | 4.96 |
| (2 in 10) | Slight possibility | 114 | 3.14 |
| (3 in 10) | Some possibility | 217 | 5.55 |
| (4 in 10) | Fair possibility | 168 | 4.40 |
| (5 in 10) | Fairly good possibility | 250 | 6.32 |
| (6 in 10) | Good possibility | 312 | 7.77 |
| (7 in 10) | Probable | 266 | 6.69 |
| (8 in 10) | Very Probable | 321 | 7.98 |
| (9 in 10) | Almost sure | 486 | 11.84 |
| (10 in 10) | Certain | 1402 | 33.77 |
| Bad data (Missing response) | | 23 | .44 |

Source: 1986 Reserve Components Survey

2. Explanatory Variables for the Standard Retention Model

The standard retention model uses the dichotomous dependent variable described above. The descriptive variables were selected based on past research on military retention and represented the variables most frequently used in military retention models. The variables are listed in Table 5 along with their respective response frequencies from the 1986 Reserve Components Survey.

From the descriptive statistics in Table 5 it is interesting to note that 72.3 percent of married individuals intended to remain in the reserves and 74.8 percent of individuals above the age of 25 intended to remain in the

TABLE 5

1986 RESERVE COMPONENTS SURVEY, EXPLANATORY VARIABLES AND RESPONSE FREQUENCIES

| | Freq Stay | % Stay | Freq Leave | % Leave |
|---|---|---|---|---|
| Marital Status | | | | |
| Married | 1874 | 72.35 | 716 | 27.64 |
| Single/other | 838 | 57.01 | 632 | 42.99 |
| Age | | | | |
| 16-20 | 60 | 34.28 | 115 | 65.71 |
| 21-24 | 156 | 33.19 | 314 | 66.81 |
| 25 or older | 2557 | 74.88 | 858 | 25.12 |
| Gender | | | | |
| Male | 2455 | 67.17 | 1200 | 32.83 |
| Female | 302 | 74.57 | 103 | 25.43 |
| Education | | | | |
| Non-HSG | 181 | 66.06 | 93 | 33.94 |
| GED/equivalent | 225 | 69.44 | 99 | 30.55 |
| HSG | 1361 | 63.90 | 769 | 36.10 |
| Higher HSG | 936 | 73.01 | 346 | 26.99 |
| Race | | | | |
| White | 2201 | 63.43 | 1269 | 36.57 |
| Black | 238 | 66.29 | 121 | 33.71 |
| Other | 151 | 65.37 | 80 | 34.63 |
| Number of Dependents | | | | |
| None | 937 | 55.91 | 739 | 44.09 |
| 1-2 | 1281 | 75.53 | 415 | 24.47 |
| 2 or more | 532 | 76.22 | 165 | 23.78 |

N = 4060
Source: 1986 Reserve Components Survey

service. Of the individuals between the ages of 16 and 20, 34.2 percent intended to remain in the service, and between the ages of 21 to 24, 33.1 percent intended to remain in the service. Of the individuals with higher than a high school diploma 73.0 percent intended to remain in the service. This

percentage is the highest percent listed for the education groups. Of the black people surveyed, 66.2 percent intended to remain in the service, while 63.4 percent of the white people intended to remain in the service. The retention percentage for the members without dependents is 55.91 percent, while the retention percentage for members with two or more dependents is 76.22 percent.

The following section describes the variables for the standard retention model.

a. Age (AGE)

The age variable is expected to have a positive effect on stated retention. As a person becomes older his financial obligations increase and he is more likely to remain in a part-time job.

b. Marital Status (MARRIED)

A married person feels an increased responsibility to remain in his present job in order to provide for his family. Thus, the married variable is expected to have a positive effect on retention.

c. Race (WHITE)

Previous studies have shown that non-whites have a greater tendency to remain in the service. [Refs. 7,13] The WHITE variable is expected to have a negative coefficient.

d. Dependents (DEP)

The number of dependents is expected to have a positive coefficient. A member that has more dependents is expected to feel increased responsibility and be less likely to change jobs. He is also more likely to have additional expenses and debts (i.e., medical, educational). Thus, he is more likely to see reserve service as a much needed source of additional income.

e. Gender (MALE)

This variable is expected to have a negative coefficient, because previous studies have shown that females have a greater tendency to remain in the service.

f. Member's Education (EDUCA)

The education variable is expected to have a positive coefficient. A person who has a higher level of education has already exhibited the necessary personal traits for following through on commitments. These individuals probably have a stronger desire for personal accomplishments and more likely to complete their enlistment agreements. They also have a greater desire for increased success.

The explanatory variables were coded as dichotomous choices for those values other than the reference categories, so that if the individual possesses the trait, the value is equal to one and to zero if he does not. Table 6 lists the value coding of the explanatory variables of the standard model.

TABLE 6

VALUE CODING OF THE EXPLANATORY VARIABLES

| VARIABLE | DESCRIPTION |
|---|---|
| Age | AGE Continuous |
| Married/Remarried | MARRIED (1,2 = 1); else = 0 |
| Race/Ethnicity | WHITE = 1; else = 0 |
| Number of Dependents | DEP Continuous |
| Gender | MALE = 1; else 0 |
| Education | EDUCA Continuous (by degree) |

The reference individual is non-caucasian, single, and female. The predicted signs for the coefficients of each variable are listed in Table 7.

TABLE 7

EXPLANATORY VARIABLES
DESCRIPTIVE TITLES AND EXPECTED SIGNS

| | TITLE | EXPECTED SIGN |
|---|---|---|
| Age | AGE | + |
| Married | MARRIED | + |
| White | WHITE | - |
| Dependents | DEP | + |
| Male | MALE | - |
| Education | EDUCA | + |

3. Description of Additional Explanatory Variables

Past research concentrated on the effects of personal characteristics such as age, marital status, sex, race, number of dependents and education on an individual's likelihood of reenlisting. But occupational and economic variables can also have important effects. Someone serving in the reserves may be there for self-improvement and self-fulfillment. Recruiting ads always stress the valuable training and experience a person receives while in the military. So non-prior service selected reservists are probably attracted to the reserves with the expectation of self-improvement and/or self-fulfillment (an opportunity to receive training or serve one's country).

A prior service veteran may be motivated to reenlist because of the acquaintances and friendships developed while in the reserves or on active duty. These friendships may be described as the "good-old-boy" network. The majority of drilling reservists have full-time civilian employment. So a weekend drill could be a place to learn about other job opportunities and occupations or a place for managers to find young and reliable workers to hire. The selected reserve may be perceived by some as a fraternal type organization. It is an action/mission-oriented job. It provides a reservist the opportunity to use his leadership skills. It also gives reservists the opportunity to learn and observe different management styles.

Other occupational advantages include certain military benefits available to the selected reservist. The reservists may use all recreational services, exchange and commissary privileges available to active duty servicemen, use military travel on a space available basis, have yearly physicals at military facilities, and have full medical coverage while on active duty. In addition, reservists are eligible for retirement benefits, GI Bill benefits since 1985, and the Survivor Benefits Insurance Plan.

These are some of the advantages of being in the reserves. Although these fringe benefits are hard to quantify and evaluate, the survey asks several questions about them. These benefits may help explain why some reservists would willingly drill and participate in active duty for training for a wage lower than they would be earning in their civilian jobs.

The economic variables selected to explain why a reservist remains in the reserves include: (a) satisfaction with military pay and allowances, (b) local unemployment rates, (c) whether income would increase or decrease if mobilized and (d) whether they received a bonus. The additional occupational and economic variables selected for the enhanced model and their frequencies are listed in Table 8.

TABLE 8

1986 RESERVE COMPONENTS SURVEY, ADDITIONAL OCCUPATIONAL AND ECONOMIC VARIABLES AND RESPONSE FREQUENCIES

| Occupational Variables | Satisfied | Not Satisfied |
|---|---|---|
| Opportunities for education/ training | 1530 | 2520 |
| Opportunity to serve one's country | 3440 | 620 |
| Acquaintances/friendships | 3541 | 520 |
| Morale of Personnel in Unit | 2650 | 1410 |
| **Economic Variables** | | |
| Military Pay and Allowances | 2620 | 1440 |
| | Yes | No |
| Did you Receive a Bonus | 2783 | 1251 |
| Currently Unemployed | 179 | 3879 |
| | Increase | Decrease |
| If mobilized 30 days would your income increase or decrease | 1081 | 2978 |

Source: 1986 Reserve Components Survey (USNR Enlisted)

The above variables will be discussed individually in the following section to give a better understanding for their selection.

a. Satisfaction with Education and Training (EDUTRN)

This variable is based on the question "How satisfied are you with opportunities for education and training?" The reserves offer a wide range of technical, on-the-job and managerial training. Reservists are also eligible for GI Bill educational benefits since July 1985. Selected

Reservists who enlist, reenlist, or extend an enlistment for a six year period are eligible for benefits. The payments for full-time undergraduate programs will be $140 a month for 36 months, not to exceed $5,040. The reserves are a good place to receive training and education and receive a paycheck at the same time. It is expected that this variable will have a positive effect on retention intentions.

b. Service to Country (SRVCTRY)

This variable comes from the question "How satisfied are you with the opportunity to serve one's country?" The reserves can be a way for the citizen who feels compelled by a patriotic sense of obligation to his country to fulfill his sense of duty while still pursuing a civilian career. A reservist is also able to serve in the Navy while remaining at home. This variable was selected in an attempt to explain why someone would drill in the reserves and attend annual active duty for training even when he loses money. It is expected that this variable will have a positive affect on retention intentions.

c. Acquaintances and Friends (ACQFR)

This variable comes from the question "How satisfied are you with acquaintances and friendships in the Reserves?" The typical reservist has a full-time civilian job. Reservists are employed in a wide variety of civilian occupations that do not necessarily match their military

designation. The benefit of new friends and acquaintances may have a positive effect on retention.

d. Morale in Unit (MORALE)

This variable comes from the question "How satisfied are you with the morale in your unit?" A person that rates the morale in his unit as very satisfactory, may by association, have high morale himself. If a person is happy in his position in the reserves he is likely to remain in the reserves.

e. Satisfaction with Pay and Allowances (PAYALW)

This variable comes from the question "How satisfied are you with the pay and allowances?" A drilling reservist receives pay for double the actual number of hours he drills. He also receives numerous fringe benefits that may not be available to a part-time civilian worker. It is interesting to note that in recent years civilian part-time workers have begun to receive increased benefits. McDonald's now offers college programs, some temporary services offer health benefits to temporary workers, and workers that share jobs (each work half a day) can also share benefits. This may have a detrimental affect on accessions in the future. However, it is expected that a person that is satisfied with his pay and allowances will most likely remain in the reserves.

f. Received a Bonus (BONUS)

This variable comes from the question "Did you receive a reenlistment bonus?" Several studies have shown that receiving a bonus positively influences a person to remain in the active military service. Bonuses for eligible selected reservists are paid for reenlistments of either three or six years. The maximum bonus payment for a three year reenlistment is $900 or $1800 for a six year reenlistment. A reservist is entitled to only one bonus. The bonus may be recouped from an individual that does not satisfactorily drill in the reserves. It is expected that a bonus will also positively influence a person to remain in the reserves.

g. Local Unemployment (UNEMPL)

This variable was obtained by matching the local (county) unemployment rate to the individual's home zip code. With the development of this variable it is possible to analyze the effects of local unemployment on a naval reservist's decision to remain in the reserves. A person who is unemployed "may perceive part-time Reserve earnings as a hedge against future spells of unemployment." [Ref. 11] The reserves may also be a way of "testing the waters" to determine if an individual is interested in a career in the military service. If it is suitable to his lifestyle he may then apply to transfer to active duty. It is expected that a person who lives in an area of high unemployment would be most likely to remain in the reserves. As the unemployment rate

rises, the civilian part-time employment opportunities for military personnel decrease and retention should increase.

h. Income Increases if Mobilized (MOBINC)

This variable comes from the question "If mobilized would your income increase, decrease or remain the same?" Studies have shown reservists are motivated not only by monetary benefits but also by social and nonpecuniary benefits as well. [Ref. 11] It is expected that a person receiving an increase in income while mobilized would be positively influenced to remain in the reserves.

i. Currently Unemployed (CUNEM)

This variable comes from the question "Are your currently employed or unemployed?" The above UNEMPL variable takes into account the local economic conditions, while this variable looks at an individual's current employment status. It is expected that a person that is unemployed would be more likely to remain in the reserves and maintain this income.

Table 9 gives the programming logic for the additional variables. The predicted signs for the coefficients of the additional variables are listed in Table 10.

## E. PRIOR VERSUS NON-PRIOR SERVICE

In the previous chapter several studies were reviewed that indicate that prior and non-prior service members are influenced by different variables or respond differently to

TABLE 9

VALUE CODING OF THE ADDITIONAL EXPLANATORY VARIABLES

| VARIABLE | DESCRIPTION |
|---|---|
| Education/Training | EDUTRN (1,2 = 1); else = 0 |
| Service to Country | SRVCTRY (1,2 = 1); else = 0 |
| Acquaintance/Friends | ACQFR (1,2 = 1); else = 0 |
| Morale in Unit | MORALE (>5 = 1); else = 0 |
| Satisfied Pay/Allowances | PAYALW (1,2 = 1); else = 0 |
| Received a Bonus | BONUS (2 = 1); else = 0 |
| Unemployment Rate | UNEMPL, Continuous |
| Income Increases if Mobilized | MOBINC (1,2 = 1); else = 0 |
| Currently Unemployed | CUNEMP (1 = 1); else = 0 |
| Non-Prior Service | NPS (1 = 1); else = 0 |

the same variables. The models were estimated separately for both prior and non-prior reservists. The prior service sample size was 2924 and the non-prior service sample size was 1136. It was expected that the signs of the coefficients would be similar for both prior and non-prior reservists. However, the relative probability weights may give some insight into what is more important to each group. This information will be helpful to policy makers when making decisions about future incentive programs.

TABLE 10

EXPLANATORY VARIABLES

| | TITLE | EXPECTED SIGN |
|---|---|---|
| Educ/Trng | EDUTRN | + |
| Serv/Cntry | SRVCTRY | + |
| Acq/Friend | ACQFR | + |
| Morale | MORALE | + |
| MilPay/Allow | PAYALW | + |
| Bonus | BONUS | + |
| Local Unemployment | UNEMPL | + |
| Mobilized Income Increases | MOBINC | + |
| Currently Unemployed | CUNEMP | + |
| Non-Prior Service | NPS | - |

## IV. ANALYZING THE RESULTS

Four separate models were developed and estimated to analyze the effects of the independent variables on an individual's intention to remain in the service. Both the standard model and the expanded model were estimated separately for the prior service sample and the non-prior service sample. A fifth model was estimated that included the current unemployment (CUNEMP) variable. This model was estimated using the entire sample. The coefficients and corresponding chi-square values of the five logit regressions are presented in Tables 16 through 20 in the Appendix. The chi-square value was used to test the significance of the coefficients of the individual variables and of the entire model. The significance of each variable can be determined by comparing the computed value with the critical value. The critical chi-square values vary with the degrees of freedom (DF) and the significance level. The critical values for one degree of freedom are

| Level of Confidence (%) | Chi-Square |
|---|---|
| 99.0 | 6.63 |
| 97.5 | 5.02 |
| 95.0 | 3.84 |
| 90.0 | 2.71 |

The chi-square value will be given in each of the tables of results from estimating the five models. In the next section

the variables will be discussed individually to allow for comparisons between prior and non-prior service personnel.

## A. COMPARISON OF THE PRIOR AND NON-PRIOR MODEL RESULTS

### 1. Age (AGE)

Age is a continuous variable, and the results show that the older a person is the more likely he is to remain in the reserves. This is as expected. An older individual has probably already experienced different jobs and knows his likes and dislikes. Thus, he is less likely to change jobs. This willingness to take risks may also decrease. This variable is significant at the 99 percent level of confidence in all four models.

### 2. Marital Status (MARRIED)

It was expected that those members who are married for the first time or remarried would have a greater tendency to stay in the reserves. A married individual has the added responsibility of one or more dependents and this increased responsibility may make the individual more stable in both his social and professional lives. This variable was only significant in the standard prior service (PS) model. It was not significant in the standard non-prior service (NPS) model, expanded prior service (PS) or the expanded NPS model. This could be attributed to the fact that the people in the NPS samples would probably be of junior grades, younger, and less likely to be married. Those that are married may only have

been married for a short period of time and may be less likely to have built up increased responsibilities and debts. It may also be an indication that income from reserves is used to buy luxuries rather than necessities.

3. Race (WHITE)

The coefficient for the WHITE variable has negative coefficients in all four models. However, none were significant at generally accepted levels. This is a surprising result. From the descriptive statistics presented in Table 5 it showed that the retention percent for whites was substantially lower than that for blacks and other nationalities.

4. Dependents (DEP)

The results indicate that the more dependents a person has the more likely he is to reenlist. The addition of dependents to a family causes additional responsibilities. There are also additional expenses, medical, dental, child care and educational. If a spouse remains at home to care for the children, it may be necessary that a reservist bring in extra income. The reserves may be chosen over some other part-time position because no matter where someone lives there is usually a reserve center close enough to drill. A reservist that transfers from reserve center to reserve center retains his seniority, promotion standing, and similar position, this is not true for most civilian part-time positions. For a person with a civilian job that requires him

to move this could be an asset. This variable is significant at the 99 percent level of confidence in all four models.

5. Gender (MALE)

The variable MALE indicates that females have a greater tendency to remain in the service than do males. This variable is significant at the 99 percent confidence level in the NPS standard model. It is significant at the 95 percent confidence level in the expanded NPS and the standard PS models. For a married women, the reserves may be the only source of employment. The reserves would give her the opportunity to have a meaningful job (one that comes with promotion opportunities, benefits and training) while still being able to remain at home with her family. The reserves only drill once a month and two weeks a year, this requirement would not be very demanding and would alleviate the stressful decisions about childcare. These advantages could be strong motivators for women.

6. Member's Education (EDUCA)

As expected, the results show that more educated people are more likely to remain in the service. However, this variable is only significant in the expanded NPS model. It is not significant in the standard NPS, standard PS or the expanded PS models. The results are surprising, since studies of active service personnel show this to be a significant factor in explaining retention. It is significant in the NPS expanded model, however it is not significant in the NPS

standard model. This split could result from personal motivations. Members with a higher education must make the choice to either remain in the reserves and strive for promotion, or to find a more challenging perhaps better paying part-time position in the civilian world where opportunities are abundant.

7. Education/Training (EDUTRN)

This variable indicates that a person satisfied with the education and training he receives while in the reserves has a greater tendency to remain in the reserves. This variable is significant at the 99 percent level of confidence in the expanded PS model. It is not significant in the NPS expanded model. This is not surprising. The reservists in this survey entered the reserves during a period of transition. The NPS personnel programs were just being instituted and there was a huge influx of NPS recruits. The training and administrative processing was not well organized and commanding officers were not convinced that people without prior service were properly trained, and were not very receptive to having them in their units. Another explanation may be that prior service people have already experienced the military and know that they like it, whereas non-prior people have not.

8. Service to Country (SRVCTRY)

This variable indicates that a person who feels he is fulfilling his obligation of service to the country while in

the reserves is more likely to remain in the reserves. This variable is significant at the 95 percent level of confidence in the expanded NPS model. It is not significant at generally accepted levels in the expanded PS model. This could show that prior service personnel feel that they have fulfilled their obligation from their previous active duty service.

9. Acquaintance/Friends (ACQFR)

This variable indicates that people satisfied with the acquaintances and friends they meet while in the reserves are more likely to remain in the reserves. An individual may consider the reserves a place for both social and professional growth. This variable is significant at the 99 percent level of confidence in the expanded PS and the expanded NPS model.

10. Morale in Unit (MORALE)

Those members who are satisfied with the morale in the unit are more likely to remain in the reserves. This variable is significant at the 99 percent level of confidence in the expanded PS and the expanded NPS model. Considering the significance of this variable careful examination of what constitutes good morale is necessary. Just a few of the factors that could influence unit morale include: leadership, mission of the unit, condition of equipment, proper training, supervision, personnel, workload, efficiency and management styles. This one variable is the culmination of numerous factors and influences. However, from personal experience the quickest way to influence the morale of an entire unit would

be through the Commanding Officer. Therefore, careful screening and training of prospective Commanding Officers is essential to good retention.

11. Satisfied Pay/Allowances (PAYALW)

Those members who are satisfied with the pay and allowances they receive in the reserves have a greater tendency to stay. People that are satisfied with their pay would be less likely to consider other part-time positions. This variable is significant at the 99 percent level of confidence in the expanded PS model. It is significant at the 95 percent level of confidence in the expanded NPS model. This again reinforces the need to ensure that military pay remains competitive with civilian salaries.

12. Received a Bonus (BONUS)

A person that receives a reenlistment bonus would be more likely to remain in the reserves. A person that receives a bonus is considered a mandatory driller. If he leaves the service before his enlistment period is over he would be required to pay back a portion of the bonus. His loss if he leaves is therefore greater than that of the average reservist. This variable is significant at the 99 percent level of confidence in both the expanded PS and the expanded NPS models.

13. Local Unemployment (UNEMPL)

It was theorized that the higher the local area unemployment rate, the more likely individuals are to stay in

the reserves. However, this variable was not significant at generally accepted levels for any of the models. This is a surprising result.

14. Income Increases if Mobilized (MOBINC)

If a member's income increases when he is mobilized then he is more likely to remain in the reserves. MOBINC was significant at the 95 percent level of confidence in the expanded PS model. However, it was not significant in the expanded NPS model. This may be due to the fact that a reservist does not expect to be mobilized, and would not place much value in an income he would never receive.

15. Currently Unemployed (CUNEMP)

A person that is currently unemployed would be positively influenced to remain in the reserves. This variable was added to the expanded model to try to analyze what effect an individual's current employment status would have on his reenlistment intention. It was expected that this variable would have an even stronger effect than the local unemployment rate. However, this variable was not significant at generally accepted levels. This could be due to the fact that the reservists consider drilling less important than a full-time job. A member who is unemployed is going to seek full-time work in spite of the fact that he is drilling. A reservist may even have to give up the reserves in order to take a full-time position. Or the reservist could have misinterpreted the survey question (i.e., a person that only

works in the reserves, may consider himself employed). It could also be that individuals in the reserves are currently students, that being unemployed is not viewed as a hardship, and the extra income from the reserves is not a necessity.

## B. GOODNESS-OF-FIT STATISTICS

This thesis set out to develop an improved model to predict selected reserve retention. Analysis of the classification tables reveals the goodness-of-fit of the various models. Comparing the PS standard model (Table 11) to the PS expanded model (Table 12) shows that again the expanded model did a better job of predicting retention behavior than the standard model. The standard model correctly predicted the behavior 71.5 percent of the time, while the expanded model increased this rate to 73.9 percent.

TABLE 11

PRIOR SERVICE STANDARD MODEL
CLASSIFICATION TABLE

| | | PREDICTED | | |
|---|---|---|---|---|
| | | Negative | Positive | Total |
| True | Negative | 9 | 831 | 840 |
| | Positive | 3 | 2081 | 2084 |
| | Total | 10 | 3914 | 2924 |

SENSITIVITY: 100% SPECIFICITY: 1.1% CORRECT: 71.5%
FALSE POSITIVE RATE; 28.5% FALSE NEGATIVE RATE: 25.0%

TABLE 12

THE PRIOR SERVICE EXPANDED MODEL
CLASSIFICATION TABLE

| | | PREDICTED | | |
|---|---|---|---|---|
| | | Negative | Positive | Total |
| True | Negative | 171 | 669 | 840 |
| | Positive | 93 | 1991 | 2084 |
| | Total | 286 | 2797 | 2924 |

SENSITIVITY: 95.5% SPECIFICITY: 20.4% CORRECT: 73.9%
FALSE POSITIVE RATE: 25.2% FALSE NEGATIVE RATE: 35.2%

Comparing the accuracy of the NPS standard model (Table 13) to the NPS expanded model (Table 14) shows that the second model is a more accurate gauge of retention behavior than the first. The first model correctly predicts retention behavior 70.4 percent of the time, while the second model correctly predicts retention behavior 72.2 percent of the time. In both the NPS and the PS samples the expanded version of the model did a better job in predicting retention behavior.

TABLE 13

THE NON-PRIOR SERVICE STANDARD MODEL
CLASSIFICATION TABLE

| | | PREDICTED | | |
|---|---|---|---|---|
| | | Negative | Positive | Total |
| True | Negative | 268 | 196 | 464 |
| | Positive | 140 | 532 | 672 |
| | Total | 408 | 728 | 1136 |

SENSITIVITY: 79.2% SPECIFICITY: 57.8% CORRECT: 70.4%
FALSE POSITIVE RATE: 26.9% FALSE NEGATIVE RATE: 34.3%

TABLE 14

THE NON-PRIOR SERVICE EXPANDED MODEL
CLASSIFICATION TABLE

| | | PREDICTED | | |
|---|---|---|---|---|
| | | Negative | Positive | Total |
| True | Negative | 269 | 195 | 464 |
| | Positive | 121 | 551 | 672 |
| | Total | 390 | 746 | 1136 |

SENSITIVITY: 82.0% SPECIFICITY: 58.0% CORRECT: 72.2%
FALSE POSITIVE RATE: 26.1% FALSE NEGATIVE RATE: 31.0%

The fifth and final model estimated had the additional unemployment variable called CUNEMP. Table 15 is the classification table for this regression. It correctly predicted retention 73.3 percent of the time.

TABLE 15

EXPANDED RETENTION MODEL WITH
ADDITIONAL UNEMPLOYMENT VARIABLE
CLASSIFICATION TABLE

| | | PREDICTED | | |
|---|---|---|---|---|
| | | Negative | Positive | Total |
| True | Negative | 445 | 859 | 1304 |
| | Positive | 226 | 2530 | 2756 |
| | Total | 671 | 3389 | 4060 |

SENSITIVITY: 91.8% SPECIFICITY: 34.1% CORRECT: 73.3%
FALSE POSITIVE RATE: 25.3% FALSE NEGATIVE RATE: 33.7%

## V. RECOMMENDATIONS AND CONCLUSIONS

The Department of the Navy should understand how policy changes influence naval reservists. Due to the savings associated with the transfer of missions to the reserves, they are beginning to play a larger role in the overall operations of the Navy. The selected reserves are presently inundated with skill-mismatches and untrained reservists. So the prior service, well-trained reservist is an extremely valuable resource. Increasing retention in the reserves is one way of maintaining this resource. The findings from this study should provide policy makers with additional information to assist them in effectively managing reserve retention.

The first recommendation concerns the area of recruiting. The age variable was significant in all six models. It indicated that as the age of the individual increases, his intention to remain in the reserves increases. This indicates it may be worthwhile to allow older individuals to enter the reserves. The reserves presently have a lateral entry program. However, there are limitations on the maximum age at which an individual can enter the service. It is recommended that the maximum age be extended. Of course, there are certain critical billets that could not easily be filled by older people, because of physical limitations. However, there are older, well-trained civilians that could easily be

incorporated into administrative, research and legal billets. The reserves currently give age waivers to individuals entering the medical and dental fields. Further study is necessary to determine which billets could accept older individuals and how this would affect the naval reserves.

The second recommendation comes from the indication that good education and training motivates members to remain in the reserves. The navy should constantly plan, update and review the training that is given to reservists. It should consider opening some of the active duty schools to reserve members. This also would increase reserve readiness because high turnover is the major cause of reduced readiness ratings in the reserves.

Third, both morale in the unit and acquaintances/friends motivate members to remain in the reserves. Further research should be conducted in the development of situational variables which would explain the effect of non-pecuniary factors on retention rates. Special attention should be given to the differences in attitudes, expectations and motivation within specific units. The Navy may consider taking more time to teach supervisors, chiefs, commanding officers and other leaders how to maintain motivation and morale through unit social activities and esprit de corps.

Fourth, satisfaction with pay and allowances also influences members to remain in the reserves. Thus it would

be beneficial to the Navy to keep pay and allowances for the reserve forces in line with civilian part-time pay.

Fifth, receiving a selective reenlistment bonus influences members to remain in the reserves. It is recommended that the bonus program be continued. Bonuses have been a proven motivator and it is expected that they will continue to be a positive influence. [Ref. 22] The bonus program also allows for targeting of ratings where retention needs are critical. The Navy gains the most by retaining individuals that have extensive and costly training. Cymrot [Ref. 23] also mentions that the larger the bonus, the greater the likelihood that active duty individuals will reenlist. The Navy should consider funding a larger bonus program, the greater the dollar value of the bonus, the greater the retention benefit.

In conjunction with analysis of the local economic conditions, it is also recommended that DOD routinely match-up local unemployment data to the individual observations in future surveys for reservists and active duty service personnel. It is then possible to determine what effect this rate may have on enlistments and reenlistments.

Seventh, it is recommended that the RCCPDS data base be given greater attention by DMDC. There were missing values for such key variables as home/unit zip codes and home state throughout this database.

## APPENDIX

### TABLE 16

THE PRIOR SERVICE STANDARD MODEL
MAXIMUM LIKELIHOOD LOGIT COEFFICIENT ESTIMATES

| | Beta Coefficient | Chi-Square |
|---|---|---|
| Intercept | -.412 | 2.49 |
| Age | .031 | 35.23*** |
| Married | .181 | 3.12* |
| White | -.093 | 0.61 |
| Dependents | .168 | 19.69*** |
| Male | -.359 | 5.37** |
| HSG | .030 | 1.72 |

N = 2924
-2 Log L = 3395.06
Model Chi-Square = 111.96 6 DF

Note: * indicates significant at 90 percent
** indicates significant at 95 percent
*** indicates significant at 99 percent

TABLE 17

THE NON-PRIOR SERVICE STANDARD MODEL
MAXIMUM LIKELIHOOD LOGIT COEFFICIENT ESTIMATES

| | Beta Coefficient | Chi-Square |
|---|---|---|
| Intercept | -1.724 | 27.62 |
| Age | .047 | 41.34*** |
| Married | .040 | 0.06 |
| White | -.131 | 0.52 |
| Dependents | .295 | 19.19*** |
| Male | -.505 | 8.61*** |
| HSG | .052 | 2.14 |

N = 1136
-2 Log L = 1381.93
Model Chi-Square = 154.60 6 DF

Note: * indicates significant at 90 percent
** indicates significant at 95 percent
*** indicates significant at 99 percent

TABLE 18

PRIOR SERVICE EXPANDED RETENTION MODEL
MAXIMUM LIKELIHOOD LOGIT COEFFICIENTS

| | Beta Coefficient | Chi-Square |
|---|---|---|
| Intercept | -1.613 | 29.32*** |
| Age | .030 | 28.16*** |
| Married | .217 | 4.13** |
| White | -.083 | .46 |
| Dependents | .198 | 25.08*** |
| Male | -.206 | 1.45 |
| HSG | -.099 | .69 |
| EDUTRN | .254 | 6.72*** |
| SRVCTRY | .115 | .91 |
| ACQFR | .458 | 14.15*** |
| MORALE | .657 | 51.40*** |
| PAYALW | .340 | 13.58*** |
| BONUS | .447 | 13.19*** |
| MOBINC | .259 | 6.05** |
| UNEMPL | -.835 | .26 |

N = 2924
-2 Log L = 3226.09
Model Chi-Square = 280.94 w 14 DF

Note: * indicates significant at 90 percent
** indicates significant at 95 percent
*** indicates significant at 99 percent

TABLE 19

NON-PRIOR SERVICE
EXPANDED RETENTION MODEL
MAXIMUM LIKELIHOOD LOGIT COEFFICIENTS

| | Beta Coefficient | Chi-Square |
|---|---|---|
| Intercept | -3.071 | 55.31*** |
| Age | .045 | 33.78*** |
| Married | .081 | .21 |
| White | -.016 | .01 |
| Dependents | .324 | 21.01*** |
| Male | -.417 | 5.36** |
| HSG | -.337 | 3.33* |
| EDUTRN | -.081 | .29 |
| SRVCTRY | .389 | 3.91** |
| ACQFR | .746 | 12.42*** |
| MORALE | .711 | 24.70*** |
| PAYALW | .309 | 4.45** |
| BONUS | .811 | 20.39*** |
| MOBINC | -.092 | .31 |
| UNEMPL | 1.878 | .52 |

N = 1136
-2 Log L = 1292.89
Model Chi-Square = 243.64 w 14 DF

Note: * indicates significant at 90 percent
** indicates significant at 95 percent
*** indicates significant at 99 percent

TABLE 20

EXPANDED RETENTION MODEL WITH
ADDITIONAL UNEMPLOYMENT VARIABLE
MAXIMUM LIKELIHOOD LOGIT COEFFICIENTS

| | Beta Coefficient | Chi-Square |
|---|---|---|
| Intercept | -2.216 | 90.27*** |
| Age | .039 | 76.02*** |
| Married | .215 | 5.74** |
| White | -.057 | .32 |
| Dependents | .235 | 46.65*** |
| Male | -.215 | 3.21* |
| HSG | -.204 | 4.28** |
| EDUTRN | .150 | 3.43** |
| SRVCTRY | .196 | 3.73* |
| ACQFR | .498 | 22.71*** |
| MORALE | .667 | 76.05*** |
| PAYALW | .331 | 18.31*** |
| BONUS | .553 | 30.56*** |
| MOBINC | .182 | 4.26** |
| UNEMPL | -.410 | .09 |
| CUNEMP | .164 | .79 |

N = 4060
-2 Log L = 4568.67
Model Chi-Square = 528.72 w 15 DF

Note: * indicates significant at 90 percent
** indicates significant at 95 percent
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